COLOR VIDEO PROJECTION SYSTEM EMPLOYING REFLECTIVE LIQUID CRYSTAL DISPLAY DEVICES

ABSTRACT OF THE DISCLOSURE

An image projector (8, 68) includes a light source (14) that illuminates a three-path reflective LCD assembly (25, 74) that produces images for projection by a projection lens (27). The light source produces S-polarized light rays that are received by a spectrally selective wave plate (36) that changes a first wavelength range of light to P-polarized light rays (34) and transmits without polarization change second and third wavelength ranges of light. A plate-type transflective polarizing beam splitter (40) transmits the P-polarized first wavelength range light rays and reflects S-polarized second and third wavelength range light rays (34). The P-polarized first wavelength range light rays transmit through a field lens (42_1) and impinge on a first reflective LCD light valve (26_1). The S-polarized second and third wavelength range light rays strike a pleochroic filter (48), which divides them into second and third wavelength range light rays (44, 46) that propagate through field lenses (42_2, 42_3) and impinge on respective second and third LCD light valves (26_2, 26_3). The light rays impinging on dark state pixels on the first LCD light valve are reflected without polarization direction change and return toward the light source along their original paths. However, the light rays impinging on illuminated state pixels on the first LCD light valve are reflected with a 90° change in polarization direction and are reflected toward the projection lens by the transflective polarizing beam splitter. The light rays impinging on illuminated state pixels on the second and third LCD light valves are reflected with a 90° change in polarization direction, are recombined by the pleochroic filter, and transmit through the transflective polarizing beam splitter toward the projection lens.